Measurement Of The Beam Spin Asymmetry And Double Spin Asymmetry In Polarized Virtual Compton Scattering At MAMI (Mainz).

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Recently two polarized Virtual Compton Scattering (VCS) experiments have been performed by the A1 collaboration at MAMI (Mainz): the first one measured the beam spin asymmetry in $\vec{e}\,p \rightarrow e\,p\,\gamma$ while the second one measured the double spin asymmetry in $\vec{e}\,p \rightarrow e\,\vec{p}\,\gamma$. Both experiments used the longitudinally polarized electron beam of the MAMI accelerator and the high resolution spectrometers of the A1 hall, and are performed at $Q^2 = 0.33$ GeV^2.

The beam spin asymmetry in photon electroproduction has been measured at a center-of-mass energy in the $\Delta(1232)$ resonance region (W=1.2 GeV), at forward c.m. angles and azimuthal $\phi = 220°$, using the out-of-plane capability of spectrometer B. This asymmetry is a direct test of the imaginary part of the Virtual Compton Scattering amplitude, which becomes complex above pion production threshold. The measurement tests model predictions such as the Dispersion Relation approach of B.Pasquini et al[1]. Asymmetry results will be presented and discussed, in the photon electroproduction channel and in the $\vec{e}\,p \rightarrow e\,p\,\pi^0$ channel which is measured simultaneously.

For the second experiment a focal plane polarimeter was used to measure the polarization of the recoiling proton. The aim is to determine the double spin asymmetry below the pion production threshold. Using the LET formalism (Low Energy Theorem) this allows to disentangle the 6 lowest-order Generalized Polarizabilities (GPs) of the proton[2], which describe the deformation of the proton in an external electromagnetic field as a function of the distance scale. The analysis is in progress, and the methods will be presented. Preliminary results for the unpolarized analysis of this experiment will be shown, yielding new values for the two linear combinations of GPs, $P_{LL} - P_{TT}/\epsilon$ and P_{LT}. These are part of the inputs to the likelihood method that is used to extract the GPs from the double spin asymmetry.

[1] Pasquini B.,*et al.*, Eur. Phys. J., A11, 185 (2001).

[2] Guichon P.A.M. and Vanderhaeghen M., Prog. Part. Nucl. Phys., 41, 125 (1998).